Designing for energy transition through Value Sensitive Design

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Designers can do much for a more sustainable future. Sustainability transitions research and empirical assessment of its course in a specific context can be used to identify a relevant space-time for different design initiatives. We explore this reasoning in advancing solar photovoltaics in heritage, where a loss of aesthetic qualities and the heritage value of buildings may curb where solar arrays are sited. By using the Value Sensitive Design framework we illustrate how a working compromise among the seemingly conflicting values involved can be found. The value mix used and the resulting concept informs solar proponents in siting solar in culturally sensitive ways and shows the heritage constituency that solar technology does not categorically mean a misfit with cultural heritage.

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Through its capacity to envision future goods and services, design has the potential to change production and consumption patterns for the better (Papanek, 1971). The increasing complexity of global problems requires new and better solutions from designers and, by implication, sustainability needs a creative force (Papanek, 1971). Many approaches have been developed for the task, ranging from Fuller's anticipatory design realized through his design science revolution (Fuller, 1964; 1982; Fuller & McHale, 1963) to Manzini and Vessoli's (2003) and Meroni's (2006) strategic design for sustainability by generating long-lasting outcomes for future improvement. Yet sustainable design initiatives easily fall short of their desired outcomes. Hoogma, Kemp, Schot, and Truffer (2002) illustrate the problem well through reminding us of the hundreds of elegant, critical, futuristic, plausible as and production-ready electric concept cars that have been designed and displayed in fairs for decades, yet there has only been a very meagre change in the road transit system as yet. Just producing a better design appears to not be enough.

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A prime reason behind the frequent curbing of the effects of sustainable design lies in socio-technical interdependencies. As Elizabeth Shove and her colleagues (Shove, Pantzar, & Watson, 2012) formulate it, our everyday work

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and consumption practices are comprised of interdependent elements, and attempts to change any one isolated element typically results in the changed element snapping back to the original constellation like an atom in a force field (Hughes, 1983). The issue of interdependencies is further aggregated in large sociotechnical systems, such as the road transit or energy system, where technology interlinkages, standards, massive sunk costs, legislation and user habits have created strong interlinked path dependencies (Geels & Schot, 2007; Hoogma et al., 2002). Electric cars or renewable energy technologies can only prosper with associated changes in the other elements that comprise their sociotechnical environment.

The import of systemic interdependencies in practice and system levels appears difficult for many designers to come to terms with − if change is so brutally difficult to achieve what room is there for creative efforts? In this paper we argue that designers can do much for a more sustainable future within large sociotechnical systems, yet this requires that sustainable design needs to pay attention to how it is positioned strategically and the principles for working this strategy have to be adequate to the task at hand. We describe how sustainability transitions research and empirical assessment of its course in a specific context can be used to identify a relevant space-time for different design initiatives and moments when even relatively modest efforts can make an addition to an ongoing sustainability transition.

The empirical setting we discuss is the furthering of solar energy in Finland. The Finnish energy system currently has low levels of intermittent renewables compared to its Scandinavian neighbours, despite its commitments to a reduction in carbon emissions by 2020. Due to its arctic location the carbon footprint per capita in the Finnish energy system was 8.5 metric tons per capita in 2013, in globally mid range with annual reduction trend of 5−7%. Despite endorsed targets to increase the share of wind energy (4,6% in 2016) and solar energy (0.06% in 2016) in electricity production, the uptake of these technologies has been slow. Below we present a brief analysis of the current state and the time-space it holds for design intervention to further it.

1 *Sustainable energy transition and forms of strategic design*

The solar photovoltaic (PV) module price has come to reach 'grid parity' (the economic viability of investment in comparison to electricity's price in an average module lifetime) for use in both residential and industrial settings in Finland given own use and thus no transmission network fees or taxes (FinSolar, 2017). The proliferation of solar technology is increasing rapidly with repeated doubling of annual installation amounts, but is still remains slow in comparison to other Scandinavian countries, hampered by a lack of net metering or feed-in tariff, the import taxation level and the bureaucracy involved in setting up solar installations (FinSolar, 2017; Pasonen, Mäkinen,